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ABSTRACT

A study explored the effects on both students and teachers of an alternative service delivery model (different from the traditional removal approach) for serving both low-achieving and learning-disabled (LD) students. The process-consultation model was chosen as the topic of this study. To its usual in-class team approach was added a focus on groups of pupils rather than on the individual student. Regular and special educators became complementary team members working with carefully structured heterogeneous small groups of students to complete academic tasks as well as learn social skills. Seven teams of teachers were trained in complementary roles, teaming skills, and cooperative learning to work with an experimental group of 21 LD and 24 low-achieving elementary and secondary school students. Measures of student achievement in reading comprehension, mathematics computation, and mathematics reasoning indicated that the model resulted in significant gains when compared to a control group of students taught with the traditional model. Experimental group students also expressed more satisfaction with the social climate over time than did pupils in the control model. Teachers saw such benefits as more time for feedback, more interactions with each other, and more positive attitudes. The study concludes that the process-consultation model provided a support system and model for both students and teachers. (CB)

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Servicing Low Achieving Pupils and Pupils with Learning Disabilities: A Comparison of Two Approaches

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Serving Low Achieving Pupils and
Pupils with Learning Disabilities:
A Comparison of Two Approaches

Nationwide, a removal approach for service delivery for pupils with learning disabilities is practiced. Yet, there are concerns about the explosion of pupils identified as learning disabled. This concern has led to caps that are now being placed on salary reimbursement for teachers of pupils with learning disabilities.

Further, concerns have been raised related to many pupils with needs who do not qualify for special services using specified criteria.

Perhaps other service delivery models would be appropriate for serving both low achieving and learning disabled pupils. This study explores the effects of an alternative service delivery model on both pupils and teachers.

Review of the Literature

For over a decade, researchers have described an interface between regular education and special education (Reynolds and Birch; 1977). The nature of this interface and its ramifications for service delivery for pupils with special needs can be described in terms of both generic and specific models of instruction. Let us consider these topics.

Generic Models

Neel (1981) described three triadic (regular classroom teacher, special educator/consultant, pupil) models where a special educator serves as a resource to a regular classroom teacher. In the purchase model (removal approach), a regular classroom teacher "buys" the services of a special educator to provide a short-term relief solution. The special educator/ consultant provides temporary direct services to identified pupils.

In the doctor-patient model (indirect consultant service approach), the regular classroom teacher knows that there are difficulties with the pupil. The special educator/consultant provides a diagnosis of problems and prescribes a remedy. The flow of expertise is from consultant to teacher.

In the process-consultation model (focus on individual pupil with an in-class teaming approach), the special educator/ consultant is a facilitator who supports the regular educator as both of them together identify the problem, analyze the interactions surrounding the problem, and develop procedures to document progress.

To Neel's work could be added a fourth generic model entitled the process-consultation model group (focus on groups of pupils). In this model, the reciprocal facilitative processes between regular and special educators are applied to meeting of individual pupil needs within groups of peers.

Specific models

The Vermont Model is a triadic model in which the special educator/consultant and the regular classroom teacher focus on an eligible student's needs within the regular classroom. The consulting teacher has an indirect influence on the identified pupil, and the effects of the intervention must be calculated on terms of pupil progress through the mediation of the regular classroom teacher. It is based on the delineation of behavioral objectives and behavior modification, making this model a very individualized

program (Christian and McKenzie, 1972; Dimmick, 1982; Fox, Egner, Paulucci, and Perchman, 1972; Hasazi, 1976; Hansen and Hansen, 1978; Knight, Meyers, Paulucci-Witcomb, Hasazi, Nevin, 1981; Mainer, 1982).

According to Tharp (1975), four questions need to be answered in triadic models such as that in Vermont. These questions include 1) Can there be a content free "process" model of consultation? 2) To whom and for whom is the consultant responsible? 3) What are the essential qualities of consultation that make it different from training or consultation? 4) How are the roles of in-house and external consultants the same? Different?

The Adaptive Learning Environment Model (ALEM) as described by Wang (1981) is a comprehensive individualized educational program that provides effective educational services for regular and mildly handicapped students in a common school setting. some important elements of this alternative educational program include: 1) a system for diagnosing and monitoring student progress; 2) teaching self-management skills; 3) team teaching among regular education, special education and Chapter I staff; 4) multi-age grouping; and 5) a plan for encouraging family involvement.

The ALEM model advocates an effective program in which children can master basic skills through prescriptive instruction while developing self-confidence in their ability to interact socially with children and adults within a specially designed classroom environment. This program appears to be useful for developing in all children positive attitudes, inquiry skills, responsibility, and cooperation (Wang, 1980). Children become independent and efficient learners.

The basic program components of ALEM include: 1) a prescriptive learning component made up of highly organized curricular options for reading and math skills which are adapted to student ability, interest and performance level; 2) open-ended, exploratory learning centers that include a variety of activities

designed to extend learning as well as accommodate student interest; 3) instructional management system procedures which facilitate implementation of both the prescriptive and exploratory components of the learning environment; 4) a classroom organization plan which makes efficient use of available classrooms and school resources; 5) an organizational plan for setting up multi-age learning situations and providing regular and special education teaming; and 6) a program for family involvement in the school experience.

In the program, each child can be working on his/her sets of prescriptions in an appropriate area of the classroom with members of the teaching team monitoring learning activities and engaging in directed teaching lessons. Because learning tasks are broken down into several steps, the teacher is able to frequently and effectively evaluate individual prescriptions and immediately prescribe appropriate learning experiences. These experiences can be directed or extended teaching, tutoring, exploratory centers, and small or large group teaching. In this kind of learning situation, encouragement and reinforcement for work and behavior are frequent, and assistance for learning difficulties is treated at the time the child is in need.

In this model children are also taught to plan their own schedules for the day through a management system called the Self-Schedule System (Wang, 1979). In this system the children have the responsibility for choosing and completing within a time limit both a number of appropriate self-selected and prescribed activities. This kind of organizational plan gives the teachers more options for facilitating appropriate learning experiences for individual students or for groups of students.

In the Cooperative Goal Structuring Model, regular and special educators carefully structure heterogenous small groups to complete academic tasks as well as learn social skills. The roles of regular classroom teacher and special educator/ consultant become those of complementary team members who

interweave their personal skills for the benefit of all children (Johnson and Johnson, 1980).

The following table summarizes the basic goal structures and interpersonal process that affect learning from cooperative, competitive, and individualistic structures. The cooperative goal structure entails such processes as high interaction, effective communication, facilitation of other's achievement, and high emotional involvement.

Table 1. Goal structures and interpersonal processes that affect learning.

Cooperative	Competitive	Individualistic
High interaction	Low interaction	No interaction
Effective communication	No, misleading, or threatening communication	
Facilitation of other's achievement: helping, sharing, tutoring	Obstruction of other's achievement	No interaction
Peer influence toward achievement	Peer influence against achievement	No interaction
Problem-solving conflict management	Win-lose conflict management	No interaction
High divergent and risk-taking thinking	Low divergent and risk-taking thinking	No interaction
High trust	Low trust	No interaction
High acceptance and support by peers	Low acceptance and support by peers	No Interaction
High emotional involvement in and commitment to learning by almost all students	High emotional involvement in and commitment the few students who have a chance to win	No Interaction
High utilization of resources of other students	No utilization of resources of other students	No Interaction
Division of labor possible	Division of labor impossible	No interaction
Decreased fear of failure	Increased fear of failure	No Interaction

From Johnson, D.W. (1980)

Along with the interpersonal processes, it is also necessary to consider academic achievement. There is evidence that controversy and group interaction increase the amount of mastery and retention of subject matter being learned (Lowry and Johnson, 1980; Johnson and Johnson, 1984). Students who experience conceptual conflict resulting from group interaction and debate are better able to generalize the principles they learn to a wider variety of situations than are students who do not experience such conceptual conflict (Inagaki and Hatano, 1977).

While the usual high ratings for academic achievement and social skill development have been found for children in mainstreamed classrooms, little evidence has been collected about models where cooperative goal structuring is paired with in-class collaboration of regular and special educator, where the special education service is provided in the regular classroom. In other words, little exploration related to the process-consultation (focus on groups of pupils) model has occurred. This study explores the issues surrounding this outgrowth of the collaborative models.

Process-Consultation Model (Groups of Children)

In this study, the process-consultation model (focus on groups of pupils) model was chosen. In this model, regular and special educators carefully structure heterogeneous small groups of pupils to complete academic tasks as well as learn social skills. The roles of regular classroom teacher and special educator/consultant become those of complementary team members who interweave their personal skills for the benefit of all children. The specific tenet of the model will be summarized under description of training later in this paper.

Research Study

Statement of the Problem

Several questions need to be addressed to determine the effects of the process-consultation (focus on groups of pupils) model. First, when special education service are provided in the regular classroom through this chosen model, how does the achievement of both low achieving (pupils who are in the lowest reading group but do not qualify for special education services) and learning disabled pupils compare with a control group of low achieving and learning disabled pupils who are served in a removal service delivery model? Second, are the interactions of regular and special educators with each other and with pupils different when they work together in the same classroom as compared to when they work separately? Third, are pupils' perceptions of their school's interpersonal climate different when they learn in process-consultation (focus on groups of pupils) models rather than the traditional removal model?

Methodology

--Population and Sample

From the entire population of 990 full time equivalent regular educators and 50 full time equivalent special educators for pupils with learning disabilities in a school district in a middle-sized midwestern city, thirteen special educators and seventeen regular educators volunteered to participate in the alternative service delivery model project. They responded to an announcement to all teachers through the School Bulletin, a newsletter distributed to each teacher in the school district. Of these, seven regular educators and six special educators (seven teams) were randomly assigned to the experimental group with the remaining educators forming the control group.

In the experimental service load were twenty-one learning disabled and twenty-four low achieving pupils. In the control group, there were sixteen learning disabled and twenty-eight low achieving pupils. The criteria for being identified as a pupil with learning disabilities is as follows:

> The pupil has a disorder in one or more of the basic psychological processes involved in understanding or in using language spoken or written, which may result in problems in listening, thinking, speaking, reading, writing, spelling, or doing mathematical calculations. This term includes such conditions as perceptual handicaps, brain injury, minimal brain disfunction dyslexia, and developmental aphasia. Pupils who have learning problems primarily due to other handicaps are not included in specific learning disabilities. Also excluded are learning problems which are a result of environmental, cultural, or economic advantage. A severe discrepancy between intellectual ability and academic achievement must exist in order for a student to be learning disabled, as measured by a Severe Deficit discrepancy between the aptitude and achievement cluster scores on the Woodcock-Johnson Psycho-educational Battery.

The criteria for being identified as a pupil with low achievement is as follows: The pupil (for elementary school) is in the low reading group and scores below the 20th percentile in reading and mathematics in the California Achievement Test. The pupil (for secondary students) is in the basic skills section for reading and math but does not qualify for special education services.

Random selection resulted in representation of varying socio-economic levels and grade levels in both experimental and control groups. (See table 2).

Table 2. Summary of demographic data for process-consultation and removal groups who completed study.

		Control Group		Experimental Group	
		Pupils	Teachers	Pupils	Teachers
SES	High	0	0	0	0
	Medium	36	13	38	12
	Low	8	4	7	2
SEX	Male	27	2	28	3
	Female	17	15	17	10
GRADE LEVEL	Primary	29	10	29	8
	Intermediate	4	3	7	4
	Junior High	11	4	9	2
DIFFICULTY	Learning disabled	16	n/a	21	n/a
	Low achieving	28		24	

--Training

The experimental group of teachers was trained in the process-consultation model during three one-day sessions. This model included two parts: 1) training in complementary roles and teaming skills and 2) training in basic tenets of cooperative learning. Training in complementary roles and teaming skills of regular and special educators included the following topics. For special educators, training included 1) observing and taking data on pupil progress, 2) structuring IEP goals to meet the pupil's (with learning disabilities) needs in groups through modifications of the regular curricula, 3) adapting materials within the group as necessary, 4) reteaching skills (if needed) to selected groups, 5) modeling appropriate teaching techniques for teaching pupils with learning disabilities. For regular educators, training

included 1) setting up a group structure within the classroom, 2) structuring the physical environments of the classroom, 3) providing overall instruction and advance organizers for group work, 4) scheduling flexibly to provide for needs of all pupils, 5) evaluating general progress of pupils. Teaming skill training for both regular and special educators included 1) techniques for offering encouragement and support, 2) steps in a problem-solving orientation to planning instruction, 3) strategies for effective communication, 4) aspects of joint planning with general educational developmental goals and specialized objectives for pupils with learning disabilities.

In addition to the teacher training in teaming skills, there was also education in the implementation of cooperative pupil groups in the learning environment. Johnson and Johnson (1984) have outlined the following important aspects of cooperative learning: 1) whenever a learning task is assigned, a clear goal structure should be given so that pupils know what behaviors are appropriated within a lesson; 2) the basic elements of the cooperative goal structure are positive interdependence, individual accountability, face-to-face interaction, and cooperative skills; 3) the instructor's role in structuring learning situations cooperatively involves clearly specifying the objects for the lesson, monitoring pupils as they work, and evaluating performance; 4) for cooperative learning groups to be productive, pupils must be able to engage in the needed collaborative skills while simultaneously learning academic material (both an academic and social goal are specified for each lesson).

Approximately fifty percent of the training time was devoted to teaming skills and fifty percent to the basic tenets of cooperative learning. The process-consultation model (focus on groups of pupils) thus included both the teaming of regular and special educator in the mainstream classroom and the use of heterogeneous cooperative groups as a structure for integrating pupils with learning disabilities into the mainstream.

The model chosen was implemented for seven months of the academic year, from October to April. Care was taken to minimize contact between experimental and control groups. Removal model group subjects were informed that they would receive training in the model at the conclusion of the experiment.

--Measures of Effects (See Table 3)

----Pupils

For pupils, both achievements and attitudes were measured. In the two achievement areas of highest concern for pupils with learning disabilities-reading and mathematics-- four subtests of the Diagnostic Achievement Battery (Newcomer and Curtis, 1984) were used. These tests were alphabet knowledge, reading comprehension, math reasoning, and math computation.

The Diagnostic Achievement Battery is a reliable, valid, nationally standardized individual achievement test. Homogeneity, or internal consistency reliability of the items, were investigated using the coefficient Alpha. This statistic is a generalization of the Kuder-Richardson Formula 20 for dichotomous "pass" or "fail" items. Coefficient alphas for a sample of 580 children of the selected tests follow: reading comprehension (.84), alphabet work knowledge (.89), math reasoning (.79), and math calculation (.80).

Criterion validity was studies by correlating scores on the Diagnostic Achievement Battery with those on selected criterion tests. For reading comprehension, the scores were correlated with the Woodcock Reading Mastery Test: Reading Comprehension (.41); for Alphabet Word Knowledge, with the Woodcock Reading Mastery Test: Word Recognition (.56); for math reasoning, with the Key Math: Reasoning (.66); for the math calculation, with the Key Math: Calculation (.58).

Construct validity was also established. Performance on the Diagnostic Achievement Battery subtests related to chronological age and school experience, correlated highly with intelligence tests, and differentiated between normal or typical pupils and those who have disabilities (Newcomer and Curtis, 1984, 23-26).

Because the chosen model included social skill goals, a measure of social climate was deemed appropriate for evaluation of this dimension.

My Class Inventory (Fraser, Anderson, Alberg, 1982), the instrument chosen, assesses five variable groupings in the classroom environment from the pupils' perspective. Thirty-eight items with a yes-no response format, were grouped as follows (Peterson, 1984):

Scale	Description	Sample Question
Cohesiveness	Extent to which students are friendly toward each other.	All students know each other very well. (+)
Friction	Amount of tension and quarreling among students.	Certain students in the class are responsible for petty quarrels. (+)
Difficulty	Extent to which students find difficulty with the work of the class.	Students in the class tend to find the work hard to do. (+)
Satisfaction	Extent of enjoyment of class work.	There is considerable dissatisfaction with the work of the class. (-)
Competitiveness	Emphasis on students competing with each other.	Students seldom compete with one another. (-)

My Class Inventory has been field tested, used widely in research, and shown to be reliable. Reliability coefficients for each of the five dimensions are as follows: cohesiveness (.80), friction (.75), difficulty (.73), satisfaction (.88), and competitiveness (.81).

Several research studies have explored the predictive validity of My Class Inventory among pupils. For example, Talmadge, and Walberg (1978), using multiple regression analysis, found that perceptions of greater classroom competitiveness were associated with lower reading achievement scores. (Fraser, Anderson, Walberg, 1982)

----Teachers' Measures

Because one goal of the chosen model was to use teaming skills with complementary roles in working with small heterogeneous groups within a classroom, it was appropriate to systematically observe the actual classroom interactions.

Classroom interactions were measured using the interaction component from the Stallings system (1977). In this tool, different types of interaction patterns were coded by tallying who initiated an interaction, who responded, and what was done. For example, TLQIA was translated as "teachers asked a large group a convergent question." Coding was done by unbiased, trained graduate student observers at five-second intervals for twenty minutes in each process-consultation and removal classroom during the first two weeks of October and the last two weeks of April. Inter-observer reliability was calculated using Shure's formula for twenty randomly selected original frames from the Stallings Interaction Tool (reliability was .86).

Teaming skills were also observed by trained graduate students using a form from the Communication Model of the Experimental Education Unit at the University of Washington in Seattle (Lewis, 1982). Items evaluated included 1) the presence of an agenda, 2) the collaboration in initiating the conference and delineating problems, 3) the equality of participation among team members during conference, 4) the quantity of verbal support comments, and 5) the presence of a written plan at the conclusion of the conference that clearly define tasks and roles. Five teams from both experimental and control groups were chosen at random and were observed for ten minutes during the first two weeks of October and the last two weeks of April.

Levels of concern were assessed using the Teacher's Concerns Statement developed by Fuller (1977). Concerns moved as follows: 1) concerns about self, 2) concerns about self as teacher (orienting oneself to psychological, social and physical environment of the school), 3) concerns about adequacy in areas such as discipline and subject matter, 4) concerns about relationships with pupils and pupils' feelings toward the teacher, 5) concerns about pupils' learning with appropriate teaching methods, 6) concerns about pupils' learning what they need as persons and factors which influence that kind of learning, 7) concerns with personal and professional development and all factors which influence pupil gain. This tool was administered to the teacher in the process consultation model during October and April. (See Table 3).

Table 3. Tools used in evaluation of alternative service delivery models.

Construct	Tool
Academic achievement Alphabet knowledge Reading comprehension Math reasoning Math computation	Diagnostic Achievement Battery (Newcomer and Curtis, 1984). Standardized, norm-referenced test.
Social Climate Cohesiveness Friction Difficulty Satisfaction Competitiveness	My Classroom Inventory (Frazer, Anderson, Walberg, 1982) Standardized, norm-referenced test.
Teacher classroom interactions Initiating and responding behaviors with children and adults	Teacher Interaction Codes (Stallings, 1977). Classroom observation tool with coding to record ongoing interactions. Interobserver reliability calculated using Shure's formula.
Teachers teaming behaviors	Analysis Form for Team Meetings (Lewis, 1982). Checklist for recording and analyzing teacher teaming behaviors, such as setting agenda, balance of regular and special educator interaction, communication skills.
Teacher concerns	Teacher Concerns Statement (Fuller, 1977). Open ended tool with scoring manual. Procedures for reconciling scores are included.

--Analysis of Data

----Pupil Measures

To test the significance of the results for pupil achievement and social climate an analysis of variance with repeated measures (BMDP Statistical Software) was done for each of the dependent measures. For each of the dependent achievement measures (alphabet word knowledge, reading comprehension, math computation, and math reasoning) and social climate measures (cohesiveness, friction, difficulty, satisfaction, and competitiveness), F tests resulted from the analysis. There were F tests for 1) time (pre and post), 2) teaching model (process-consultation or removal), 3) ability level (learning disabled and low achieving), 4) the interaction of time and teaching model, 5) the interaction of time and ability level, 6) interaction of teaching model and ability level, and 7) for the interaction of teaching model, ability level, and time, for each dependent measure.

----Teacher Measures

Configuration of teacher interactions were ranked and compared for pre and post implementation observations for process-consultation and removal models.

A simple sign test was applied to the measures of team interaction and levels of teacher concern.

Data on an open-ended survey of teachers in the experimental group were summarized.

RESULTS

--Pupil Measures

For each of the achievement and social climate dependent variables, analysis of variance with repeated measures will be reported. The significance of results were tested at the .05 level. Cell mean scores and standard deviations for each dependent variable will be given.

The independent variables are labeled teaching model (process consultation [PC] or removal [R] approaches), classification (learning disabled [LD] or low achieving [LA]), and time (pre or post).

----Alphabet Word Knowledge

For the achievement dependent variable, alphabet word knowledge, there were no significant differences in classification and time. There also were no significant differences in teaching model or the interaction of time and teaching model.

There were significant differences in classification, time, and the interaction of time and classification. The low achieving pupils scored higher than pupils with learning disabilities. The pupils scored higher in the post test as compared with the pre test. The pupils with learning disabilities had little change from pre to post test, whereas, the low achieving pupils made higher gains.

Although the interaction of time, classification, and model was not significant, the low achieving pupils did have greater gain pre to post in the process-consultation model as compared with the removal approach. (See tables 4, 5 and 6).

Table 4. Analysis of variance with repeated measures for alphabet word knowledge.

	DF	MS	F	P
Model (P-C, R)	1	7.43597	.82	.3665
Classification (LD, LA)	1	45.94146	5.09	.0267
Model & Classification	1	31.45687	3.49	.0654
Error	81	9.01784		
Time (Pre, Post)	1	28.66505	7.45	.0078
Time x Model	1	1.94827	.51	.4789
Time x Classification	1	17.43927	4.53	.0364
Time x Model x Classification	1	6.62416	1.72	.1933
Error	81	3.84998		

Table 5. Cell mean scores for alphabet word knowledge.

		R LD	R LA	P-C LD	P-C LA	Marginal
PRE	1	6.68750	7.73913	6.05263	5.81481	6.55294
POST	2	6.68750	8.60870	6.42105	7.92593	7.04706
Marginal		6.68750	8.17391	6.23684	6.87037	7.04706
Count		16	27	19	23	85

Table 6. Standard deviations for alphabet word knowledge results.

	R LD	R LA	P-C LD	P-C LA
1	2.52240	2.25383	3.27403	2.45352
2	2.60048	2.60068	2.21900	2.36910

----Reading Comprehension

For the achievement dependent variable, reading comprehension, there were no significant differences in 1) method, 2) the interaction of teaching model and classification, or 3) the interaction of teaching model, time, and classification.

There were significant differences in classification, time, and the interaction of teaching model and time. The low achieving pupils scored higher than the pupils with learning disabilities. The pupils scored higher in the post test as compared to the pre test. Both the low achieving and learning disabled pupils had greater gains over time in the process-consultation model as compared with the removal approach. (See Tables 7, 8, and 9).

Table 7. Analysis of variance with repeated measures for reading comprehension.

	DF	MS	F	P
Model	1	22.33901	3.46	.0663
Classification	1	31.20897	4.84	.0306
Model x Classification	1	17.91069	2.78	.0994
Error	81	6.44726		
Time	1	75.58155	21.74	.0000
Time x Model	1	25.65254	7.38	.0081
Time x Classification	1	4.06131	1.17	.2830
Time x Model x Classification	1	3.06908	.88	.3503
Error	81	3.47739		

Table 8. Cell mean scores for reading comprehension.

		R LD	R LA	P-C LD	P-C LA	Marginal
	Time					
	1	6.15789	7.65217	5.56250	5.18519	6.14118
	2	6.68421	8.26087	7.12500	7.92593	7.58824
Marginal		6.42105	7.95652	6.34375	6.55556	6.86471
		16	27	19	23	85

Table 9. Standard deviations for reading comprehension.

		R LD	R LA	P-C LD	P-C LA
	Time				
PRE	1	2.92047	2.30446	1.97943	2.55145
POST	2	2.18708	2.18255	1.66842	1.88818

----Math Computation

For the achievement dependent variable, math computation, there were no significant differences in 1) teaching model, 2) the interaction of teaching model and classification, 3) the interaction of time and teaching model, and 4) the interaction of time, method, and classification.

There were significant differences in classification and time. The low achieving pupils scored higher than pupils with learning disabilities. The scores were higher overall in the post test as compared with the pre test.

Although not statistically significant, both pupils with learning disabilities and those with low achievement appeared to make greater gains in the process-consultation as compared with the removal approach. (See tables 10, 11, and 12).

Table 10. Analysis of variance with repeated measures for math computation.

Model	1	.16731	.02	.8798
Classification	1	126.60609	17.40	.0001
Model x Classification	1	24.75884	3.40	.0687
Error	81	7.27498		
Time	1	108.83884	20.92	.0000
Time x Model	1	5.07536	.98	.3262
Time x Classification	1	4.69145	.90	.3451
Time x Model x Classification	1	2.98250	.57	.4511
Error	81	5.20150		

Table 11. Cell mean scores for math computation.

Time		R LD	R LA	P-C LD	P-C LA	Marginal
PRE	1	5.05263	7.52174	5.81250	6.18519	6.22353
POST	2	6.26316	8.86957	7.18750	8.77778	7.94118
Marginal		5.65789	8.19565	6.50000	7.48148	7.08235
		16	27	19	23	85

Table 12. Standard deviations for reading comprehension.

Time		R LD	R LA	P-C LD	P-C LA
PRE	1	2.34432	2.37028	1.84010	1.90381
POST	2	2.19754	3.56622	2.10402	2.68505

----Math Reasoning

For the achievement dependent variable, math reasoning, there were no significant differences in teaching model, time, or the interactions of these and classification.

There was a significant difference in classification, with the low achieving pupils scoring significantly higher than pupils with learning disabilities.

The pupils with learning disabilities appeared to have greater gain in the removal model.

Table 13. Analysis of variance with repeated measures for math reasoning.

FACTORS	DF	MS	F	P
Model	1	.43437	.06	.8097
Classification	1	36.34145	4.88	.0299
Model x Classification	1	12.43849	1.67	.1997
Error	81	7.43977		
Time				
Time x Model	1	7.72676	3.08	.0829
Time x Classification	1	.93169	.37	.5437
Time x Model x Classification	1	.73837	.29	.5887
Error	81	2.50576		

Table 14. Cell means for math reasoning.

		R LD	R LA	P-C LD	P-C LA	Marginal
Time						
PRE	1	5.87500	6.55556	5.52632	7.00000	6.31765
POST	2	6.75000	6.85185	5.78947	7.30435	6.71765
Marginal		6.31250	6.70370	5.65789	7.15217	6.51765

Table 15. Standard deviations for math reasoning.

		R LD	R LA	P-C LD	P-C LA
PRE	1	1.70783	2.85998	2.19516	1.85864
POST	2	1.73205	2.69906	1.87317	2.00986

----Cohesiveness

For the social climate dependent variable, cohesiveness, there were no significant differences in time, teaching model, and classification or interactions among these. (See tables 16, 17, and 18).

Table 16. Analysis of variance with repeated measures for cohesiveness results.

FACTORS	DF	MS	DF	P
	1	28837.02542	1533.28	0.0000
Model	1	13.55208	.72	.3985
Classification	1	.45588	.02	.8767
Model x Classification	1	4.97030	.26	.6086
Error	81	18.80744		
Time	1	.01150	.00	.9698
Time x Model	1	1.41082	.18	.6752
Time x Classification	1	14.00343	1.75	.1890
Time x Model x Classification	1	1.78228	.22	.6378
Error	81	7.97931		

Table 17. Cell mean scores for cohesive results.

	R LD	R LA	P-C LD	P-C LA	Marginal
PRE 1	14.00000	12.96296	13.05263	13.13043	13.22353
POST 2	13.37500	13.92593	12.47368	13.30435	13.32941
Marginal	13.68750	13.44444	12.76316	13.21739	13.27647
Count	16	27	19	23	85

Table 18. Standard deviations for cohesiveness results.

	R LD	R LA	P-C LD	P-C LA
PRE 1	3.34664	3.78744	4.23574	3.40193
POST 2	3.24294	3.39599	3.80597	3.88979

----Satisfaction

For the social climate dependent variable, satisfaction, there were no significant differences in method, classification, or time.

There were significant differences in the interactions of time and classification and the interaction of time, classification, and teaching model. Learning disabled and low achieving pupils in the removal model and low achieving pupils in the process-consultation model appeared to experience slightly less satisfaction over time. The pupils with learning disabilities in the process-consultation model appeared to experience much greater satisfaction over time. (See tables 19 and 20).

Table 19. Analysis of variance with repeated measures for satisfaction results.

FACTORS	DF	MS	F	P
Model	1	8.76314	.55	.4591
Classification	1	30.21943	1.91	.1710
Model x Classification	1	1.45105	.09	.7629
Error	81	15.83594		
Time	1	16.55289	1.93	.1682
Time x Model	1	24.90400	2.91	.0919
Time x Classification	1	38.09344	4.45	.0380
Time x Model x Classification	1	44.95522	5.25	.0245
Error	81	8.56256		

Table 20. Cell mean scores for satisfaction results.

	R LD	R LA	P-C LD	P-C LA	Marginal
PRE 1	14.37500	14.96296	11.89474	14.95652	14.16471
POST 2	12.87500	13.62963	14.05263	13.08696	13.43529
Marginal	13.62500	14.29630	12.97368	14.02174	13.80000
	16	27	19	23	85

Both low achieving and learning disabled pupils appeared to experience less difficulty over time, whereas both groups of pupils in the removal model had approximately the same perceptions of difficulty over time.
(See tables 21, 22, 23, and 24).

Table 21. Analysis of variance with repeated measures for difficulty results.

FACTORS	DF	MS	F	P
Model	1	36.49108	.94	.3343
Classification	1	11.76060	.30	.5832
M x C	1	70.02241	1.81	.1825
Error	81	38.75353		
Time	1	10.23821	1.06	.3057
T x M	1	35.61371	3.70	.0581
T x M x C	1	3.81720	.40	.5309

Table 22. Cell mean scores for difficulty results.

	R LD	R LA	P-C LD	P-C LA	Marginal
PRE 1	20.37500	18.22222	19.0526	19.52174	19.16471
POST 2	20.5	18.96296	17.31579	18.39130	18.72941
MARGINAL	20.43750	18.59259	18.18421	18.95652	18.94786

Table 23. Standard deviations for difficulty results.

	R LD	R LA	P-C LD	P-C LA
PRE 1	4.48516	3.94514	5.50228	5.32213
POST 2	3.3	4.71072	5.21365	5.58632

Table 24. Standard deviations for satisfaction results.

Y=		R LD	R LA	P-C LD	P-C LD
Time					
PRE	1	3.03040	2.80770	3.49436	4.74321
POST	2	3.18067	3.04009	4.11601	3.17537

----Competition

For the social climate dependent variable, competition, there were no significant differences in time, teaching model, and classification or interaction among these. (See tables 25, 26, and 27).

Table 25. Analysis of variance with repeated measures for competition results.

FACTORS				
Model	1	32.29101	2.73	.1025
Classification	1	5.58669	.47	.4940
M x C	1	5.24230	.44	.5076
Error	81	11.83583		
Time	1	.04167	.01	.9385
T x M	1	2.59318	.37	.5435
T x C	1	3.37174	.48	.4886
T x M x C	1	19.59483	2.81	.0973
Error	81	6.96530		

Table 26. Cell mean scores for competition results.

	TIME	R LD	R LA	P-C LD	P-C LA	MARGINAL
PRE	1	16.25000	16.66667	15.94737	15.69565	16.16471
POST	2	16.87500	16.48148	14.68421	16.39130	16.12941
MARGINAL		16.56250	16.57407	15.31579	16.04348	16.14706
COUNT		16	27	19	23	85

Table 27. Standard deviations for competition results.

METHOD =		R	R	P-C	P-C
CLASSIFY =		LD	LA	LD	LA
	TIME				
PRE	1	2.90975	2.70327	3.08173	3.54753
POST	2	3.38378	2.86048	3.21546	2.91920

----Friction

For the social climate dependent variable, friction, there were no significant differences in time, teaching model, classification, or interaction among these. (See tables 28, 29, and 30).

Table 28. Analysis of variance with repeated measures for friction results.

FACTORS	DF	MS	F	P
Model	1	5.88122	.27	.6031
Classification	1	2.50388	.12	.7343
M x C	1	6.28755	.29	.5909
Error	81	21.58296		
Time	1	20.85978	1.63	.2060
T x M	1	18.05404	1.41	.2390
T x C	1	5.58689	.44	.5112
T x M x C	1	16.91084	1.32	.2544
Error	81	12.83276		

Table 29. Mean scores for friction results.

		R LA	R LD	P-C LA	MARGINAL
	TIME				
PRE	1	16.25000	17.40741	17.00000	16.08696	16.74118
POST	2	17.31250	16.44444	18.10526	17.73913	17.32941
MARGINAL		16.78125	16.92593	17.55263	16.91304	17.03529
COUNT		16	27	19	23	85

Table 30. Standard deviations for friction results.

		R LD	R LA	P-C LD	P-C LA
TIME					
PRE	1	5.15752	4.20859	3.92994	4.06664
POST	2	2.98259	4.44914	4.34479	3.68310

--Teachers' Classroom Interactions

In the pre-implementation observation, there was little difference in the patterns between process-consultation and removal groups. Of over seventy different patterns coded, the top ranked pattern for both groups was instruction to the large group. Other interactions among the top five for the removal group were teacher instructing a single child, teacher observing pupils, teacher asking convergent questions, and teacher praising a child. For the process-consultation group, similar interactions occurred, except the interaction of teacher praising single child was excluded, while teacher asking single pupil convergent questions was added to the top five interaction patterns.

In the post-implementation observation, the top ranked pattern for both process-consultation and removal groups was still large group instruction. For the control group, the fifth ranked pattern changed from teacher praising single child (pre) to teacher observing single child (post).

Perhaps the most interesting change for the process-consultation group was the addition of small group instruction. There were substantial increases in the numbers of interactions devoted to small group involvement from pre- to post-implementation observation. There were also great increases in the number of categories of interactions related to small group interaction. Another interesting change for the process-consultation group was the number of interactions between teacher and teacher as they teamed in the classroom; these interactions included supportive comments and open-ended questions. (See Table 31 and Table 32).

Table 31. Pre-post comparison of top-ranked teacher interactions patterns between removal and process-consultation groups.

Patterns		REMOVAL		PROCESS-CONSULTATION	
		PRE	POST	PRE	POST[a]
	n of interactions	357	336	294	294
% of Total	n of categories of interactions	74	71	71	75
Teacher instructing large group		15.12%	17.73%	10.89%	9.87%
Teacher instructing single pupil		9.5 %	5.44%	6.55%	not in top five
Teacher observing pupils		5.89%	5.78%	5.06%	3.40%
Teacher asking large group convergent questions		5.32%	5.44%	6.85%	not in top five
Teacher praising pupil		not in top five	4.76%	6.55%	5.78%
Teacher asking single pupil convergent questions		4.76%	not in top five	not in top five	not in top five
Teacher instructing small group		not in top five	not in top five	not in top five	6.46%

[a] After the first 4, no single pattern emerged as one of the top 5.

Table 32. Pre-post comparison of total teacher/small group and teacher/teacher involvement interaction patterns.

		REMOVAL		PROCESS-CONSULTATION	
		Pre	Post	Pre	Post
Patterns	n of interactions	357	336	294	294
	n of categories	74	71	71	75
Number of all small group interactions		8.4%	12.4%	5.8%	19.1%
Number of categories involving small groups		10.8%	11.3%	15.3%	31.6%
Number of categories involving teacher/ teacher interactions		2.2%	2.7%	4.1%	8.8%

--Teachers' Teaming Skills

Although the numbers do not warrant statistical analysis, there are indications of direction in the development of teaming skills. In the process-consultation model as compared to the removal model, 1) agendas were more complete and more likely to be written down, 2) problems were jointly stated, 3) participation was balanced, 4) supportive comments increased, and 5) follow-up plans were more often written.

In the removal group, there were few changes from pre to post assessment. The problems were stated by the special educator and the special educator participated more frequently. Supportive comments increased slightly while the quality of the agenda and written follow-up plans decreased slightly. (See Table 33).

Table 33. Direction of change in teaming skills among regular (RE) and special educators (SE).

	Removel n = 10			Process-Consultation n = 10		
	Pre	Post		Pre	Post	
Quality of agenda (1=high to 5=low)	4.2	5.0	-	3.6	2.6	+
Joint delineation of problems	100% SE	100% SE	0	80% SE 20% RE	60% 40%	+
Balance of participation	75% SE 25% RE	75% SE 25% RE	0	75% SE 25% RE	50% SE 50% RE	+
Quantity of verbal Supportive statements	4.0	5.0		5.5	9.0	+
Written follow-up plans with both educator roles defined	25%	0%	-	30%	67%	+

--Teacher's Level of Concern

There was a general direction for teachers in the process-consultation group to move to higher levels of concern from pre- to post- assessment. They moved from concerns about themselves and teaching subject matter to greater concern about pupils and what they, as individuals, needed to learn. There were also concerns about broader professional issues related to organizational structures that would meet pupil learning needs. (See Table 34).

Table 34. Level of concern in teachers in experimental groups.

Teacher Number	Pre	Post	
1	2.3	4.0	+
2	4.0	4.5	+
3	5.0	4.4	-
4	3.5	4.7	+
5	3.0	4.8	+
6	2.7	5.2	+
7	4.6	4.6	0
8	4.5	3.7	-
9	2.4	6.0	+
x	3.76	4.66	+

--Summary of qualitative remarks on structured survey given to teachers in the experimental group

----General impressions of team teaching

Teachers commented that through this process, a great support system was built into the teaching experience. There was a freshness in approach which gave pupils more enthusiastic instructors. Several suggested that this model

could be a "burn-out" prevention strategy. Joint problem solving where "two heads are better than one" was stressed. They commented about the techniques that can be learned from other teachers, techniques such as using multisensory approaches, techniques for structuring and monitoring small groups, and for stating general educational/developmental goals. Teachers in special education learned about the functioning of identified pupils in the regular classroom and about pupil expectations in the mainstream. Teacher teams spent an average of fourteen minutes in joint planning for each session.

----General statements about the process-consultation model

Because pupils encourage and check each other, there is a responsible plan to help those who have difficulty. Pupils can complete assignments with more satisfaction because of the support system for pupils. Pupils gain a chance to serve as "managers" or "teachers" that assist everyone in creating good thinking patterns. When pupils are held accountable for learning as found in this model, they work together to solve problems. Pupils with learning disabilities and those who are low achieving become part of a group. Special education teachers can provide suggestions that are incorporated into the pupils' learning experiences for the entire day or period. Regular and special educators can, together, develop general and specialized goals to meet the needs of all learners--this is a goal-oriented model. Teachers constantly monitor the pupils' progress in groups so time of both special and regular educator is well used. The product resulting from the group experience is good; this helps the poorer students to feel good about their contribution to the finished product.

----Comments from Pupils:

Pupils commented that they could ask partners if they did not know an answer. They could work together and sometimes disagree. Pupils also stated that they were not afraid to make a mistake and that they would have help when they were "stuck". Pupils with learning disabilities liked to stay in the regular class, and they often contributed creative ideas to the group. Many pupils found that their grades improved. Some said that it was noisy.

----Response from parents

Parents had favorable comments especially when they viewed a video-tape of the groups operating in the classroom. The social goals stated for lessons were positive in the parents' view. Parents liked the fact that their children were remaining in the regular classroom for instruction. Grandparents became part of cooperative groups on a special visitation day and greatly appreciated the experience.

----Responses from principals

Principals were generally very supportive, impressed, and enthusiastic. Some took time to observe, to allow inservices for other faculty in buildings, and to encourage district wide inservice meetings related to this model. One principal expressed concern related to the specific roles of regular and special educators in the same class.

----Continuance of use of team teaching with cooperative groups

All teachers stated that they would continue to use cooperative groups in team teaching situations. Some expressed concern about scheduling difficulties and hoped that opportunities would be afforded to expand the model.

DISCUSSION

--Pupil Achievement

The process-consultation model as compared with the removal model appeared to have more positive effects over time on reading comprehension for both pupils with learning disabilities and those with low achievement.

Although not statistically significant, the pupils with low achievement and learning disabilities gained more in alphabet knowledge in the process-consultation model than the removal approach. The same was true for math computation. In math reasoning, the pupils with learning disabilities had greater gain in the removal model.

--Pupil Attitudes

For the social-climate dimension of satisfaction, the pupils with learning disabilities in the process-consultation model expressed more satisfaction over time than did those pupils in the removal model. For the social climate dimension of difficulty, both the low achieving and learning disabled pupils in the process-consultation model as compared with those in the removal model expressed feelings that the work was less difficult over time. There were no significant differences in model effects in the other three social climate dimensions of friction, cohesion, and competitiveness.

These results are consistent with the open-ended comments where pupils indicated the support they felt from peers, making the work seem less difficult. The pupils with learning disabilities stated that they liked being part of and contributing to group interaction.

--Teacher Results

For teachers, there were benefits. As compared to teachers in the removal model, teachers in the process-consultation model spent more time offering feedback to small groups, thus meeting pupils needs directly and efficiently. Teachers in the process-consultation model had more interactions with each other and these were of a supportive nature.

In their team planning sessions, teachers in the process-consultation model worked as equal partners in delineating the problems of children and supported each other with helpful comments. In the removal approach, the special educators stated the problems and solutions to those problems.

The teachers in the process-consultation model grew in their level of concerns, from personal concerns related to subject matter competence to broader professional concerns about teaching what pupils need to learn.

Positive attitudes were expressed by teachers in the process-consultation model. Given issues of teacher burnout, the support system developed in this model seem crucial for survival and growth.

--Further Considerations

Is this model worth implementing? This was a small study done in one city. The process-consultation model would need to be replicated on a broader scale to coroborate results before generalized statements could be offered.

Follow-up studies could address such questions as these: 1) Would specified content in math and reading for specified length of instruction be learned more effectively in cooperative groups if a special educator is present in the classroom as compared to the regular educator assuming full responsibility for all pupils? 2) Would a teaming model with the regular and special roles specified as in this study without the cooperative learning component be as effective as the process-consultation model with this component?

In this study, when the regular educator with skills of setting general education and developmental goals and the special educator with skills in modifying methods and materials and charting pupil progress interrelated, a support system developed. This system provided, in turn, a support system and model for pupils.

Pupils, with a teacher team as model, mentor, monitor, and facilitator, came with individual skills and contributed their resources to each other in a group. They assisted each other with academic tasks and learned to take risks. Through discussion, cognitive conflict emerged and strengthened and integrated the learning experience. Pupils gained mastery of subject matter and interpersonal skills. They learned not to fear difficult tasks and became more satisfied with the classroom climate.

It is in this interdependent, interacting, goal-oriented model that pupils are prepared to live and work together, in interrelationship, in a free, democratic society.

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